Title: POGability

Link to Outcomes:

- **Communication**   Students will write on their experiences with probability and chance.

- **Reasoning**   Students will use reasoning to explain probability in their math journals.

- **Connections**   Students will relate probability to the widely played game using milk caps, called "pogs."

- **Estimation**   Students will hypothesize on the outcomes of their trials with the milk caps.

- **Statistics**   Students will collect data in the classroom, organize the data and then read and interpret the displays of data.

- **Probability**   The students explore the concept of chance by using the milk caps.

Brief Overview:

This unit is designed as an introductory unit to the concept of probability using a widely played game of chance using milk caps, commonly called "pogs". Students will identify the relationship between predictions and outcomes as it relates to probability.

Grade/Level:

Grade 3

Duration/Length:

This is designed to be a three period unit done over three days.

Prerequisite Knowledge:

Students will need a basic understanding of chance. The students need a background knowledge in the interpretation and creation of bar graphs.

Objectives:

The students will be able to:

- gather and graph data using a double bar graph.
- predict outcomes.
- demonstrate their ability to work cooperatively in groups.
- communicate, through writing, discussion and drawing, their knowledge of probability and chance.

Materials/Resources/Printed Materials:

- 10 milk caps per student
- One slammer per student
- One slamming milk cap per group
- Math Journals
- Chart Paper--one sheet per class
- Markers for writing on chart
- Overhead Projector
- Transparency Markers
- Clear Transparency
- Resource Sheet 1
- Resource Sheet 2 (transparency)
- Resource Sheet 3 for each student
- Resource Sheet 3 (transparency)

Development/Procedures:

Day 1: Introduction

- Tell the students to create a paragraph in their math journals describing the chances that they have taken in their lives. Use the Think-Pair-Share cooperative learning method to allow the students to discuss their experiences with each other. Allow volunteers to give the best examples from their pairs.

- Relate to the class the relationship between the words chance and probability.

- Have the class create a list with chart paper of generalized probabilities using their life experiences. Use some examples to get the class started such as:

    There is a 50% chance of rain today.
    The chance that a student in this class will be a girl is one out of two.
    The is a one in a billion chance I may win the next Lotto.

- Distribute 10 milk caps and 1 slammer to each student. Allow 5 minutes for the students to "free explore". Discuss with the students the history of the milk cap game and its inventor. Tell the students to reflect on the following questions during the evening and to be prepared to answer them the next day:

  How many times have you played this game?
  Do you win every time you play?
  Do you like playing the game? Why or Why not?

Day 2: Review and Concept Development

- Write the homework questions from the last class on the board. Ask the students to give some of their reflections as their warm up. Tie in chance and probability with the milk cap game during the discussion of the questions.

- Put the students in pairs again. Allow one person from each pair to retrieve the materials (10 milk caps and 1 slammer). Tell each student to choose five milk caps. Demonstrate how to "slam" (hit the milk caps with the heavy metal slammer) the milk caps to the class. Tell the students to place one milk cap picture side down on the desk, explaining that this protects the picture. Ask the students to predict on which side they think the milk cap will land (the side with a picture, "front," or the side without a picture, "back"). Tell the students to slam the milk caps. Ask the students what happened. Tally on the overhead the numbers predicted and the numbers which resulted from the slamming. Have the students to try this with one, two, three, four and finally, all five milk caps, keeping a tally of those landing front up for trials one through five using Resource Sheet 1.

- Discuss the results. Have them look to see how many times the cap landed front up in each trial. Be sure to make the connection between number of milk caps and the probability for having them land front up. Allow students to practice these trials again with the remaining class time.

Day 3: Next Day

- Write the following for the students to answer for their warm up to be written in their math journals:

  Are you a fortune teller? How close were you with your predictions to what really happened when you slammed your milk caps? Draw a picture of something that happened when you were working with your milk caps. Have the students verbally respond to the first question after writing in their journals.

●⬜   Put the students into groups of three or four. Have a transparency (Resource Sheet 2) prepared to put on the overhead describing the group work.

●   Have the students make predictions and then work with the caps. Tell the students to create a bar graph (Resource Sheet 3) from their predictions and results of their trials as their method of recording. Proceed for trials in the same method as yesterday.

●   Use a transparency of Resource Sheet 3 on the overhead. Allow the recorder from each group to come to the overhead and fill in their prediction and outcome for one of the possible trials.   Discuss the relations between student prediction and outcomes.   Ask the students what we know about probability and how it relates to things that happen in our lives.

Evaluation:

Have the students record data in the form of a bar graph based upon their predictions and outcomes as they occur in a normal game of milk caps.

Extension/Follow Up:

Allow students throughout the school to participate in a short milk caps tournament. Have the class make predictions and graph the data in math class.

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Name_____ **Date**_____

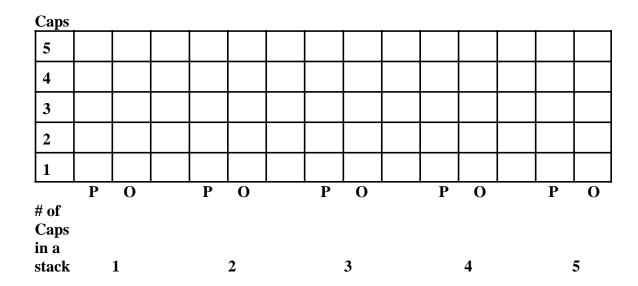| Caps	Predictions	Outcomes
1		
2		
3		
4		
5		

What time did you wake up today?

If you were the first to wake up, you are the recorder.
Your job will be to write down the information.

If you were next to wake up, you are the materials person.
You need to get and bring back the materials.

If you were the last to wake up, you are responsible for
slamming the milk caps.

Name_____ **Date**_____

Predict-O-Graph

Caps

5														
4														
3														
2														
1														

       P   **O**   **P**   **O**   **P**   **O**   **P**   **O**   **P**   **O**

 # of
Caps
in a
stack   **1**   **2**   **3**   **4**   **5**

Key:	**P = Prediction**	**O = Outcome**